

# Testing Django Configurations Using Combinatorial Interaction Testing

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# Django

**django**

The web framework for perfectionists with deadlines.

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Django makes it easier to build better Web apps more quickly and with less code.

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## Meet Django

Django is a high-level Python Web framework that encourages rapid development and clean, pragmatic design. Built by experienced developers, it takes care of much of the hassle of Web development, so you can focus on writing your app without needing to reinvent the wheel. It's free and open source.

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```

# Default Django settings. Override these with settings in the module
# pointed-to by the DJANGO_SETTINGS_MODULE environment variable.

# This is defined here as a do-nothing function because we can't import
# django.utils.translation -- that module depends on the settings.
gettext_noop = lambda s: s

#####
# CORE #
#####

DEBUG = False
TEMPLATE_DEBUG = False

# Whether the framework should propagate raw exceptions rather than catching
# them. This is useful under some testing situations and should never be used
# on a live site.
DEBUG_PROPAGATE_EXCEPTIONS = False

# Whether to use the "Etag" header. This saves bandwidth but slows down performance.
USE_ETAGS = False

# People who get code error notifications.
# In the format [('Full Name', 'email@example.com'), ('Full Name', 'anotheremail@example.com')]
ADMINS = []

# List of IP addresses, as strings, that:
# * See debug comments, when DEBUG is true
# * Receive x-headers
INTERNAL_IPS = []

# Hosts/domain names that are valid for this site.
# "*" matches anything, ".example.com" matches example.com and all subdomains
ALLOWED_HOSTS = []

# Local time zone for this installation. All choices can be found here:
# http://en.wikipedia.org/wiki/List_of_tz_zones_by_name (although not all
# systems may support all possibilities). When USE_TZ is True, this is
# interpreted as the default user time zone.
TIME_ZONE = 'America/Chicago'

# If you set this to True, Django will use timezone-aware datetimes.
USE_TZ = False

```

# 23 Boolean parameters

```
DEBUG = False
TEMPLATE_DEBUG = False
DEBUG_PROPAGATE_EXCEPTIONS = False
USE_ETAGS = False
USE_TZ = False
USE_I18N = False
USE_L10N = False
EMAIL_USE_TLS = False
EMAIL_USE_SSL = False
APPEND_SLASH = False
PREPEND_WWW = False
USE_THOUSAND_SEPARATOR = False
USE_X_FORWARDED_HOST = False
SESSION_COOKIE_SECURE = False
SESSION_COOKIE_HTTPONLY = False
SESSION_SAVE_EVERY_REQUEST = False
SESSION_EXPIRE_AT_BROWSER_CLOSE = False
CSRF_COOKIE_SECURE = False
CSRF_COOKIE_HTTPONLY = False
SECURE_BROWSER_XSS_FILTER = False
SECURE_CONTENT_TYPE_NOSNIFF = False
SECURE_HSTS_INCLUDE_SUBDOMAINS = False
SECURE_SSL_REDIRECT = False
```

# 23 Boolean parameters

$2^{23}$  potential configurations

only 8 tests needed to test all combinations of values between any pair of parameters

# 3 Boolean parameters

debug	template_debug	debug_propagate_exceptions
TRUE	TRUE	TRUE
FALSE	FALSE	FALSE

# 3 Boolean parameters

debug	template_debug	debug_propagate_exceptions
TRUE	TRUE	
FALSE	FALSE	
TRUE	FALSE	
FALSE	TRUE	

# 3 Boolean parameters

debug	template_debug	debug_propagate_exceptions
TRUE	TRUE	TRUE
FALSE	FALSE	TRUE
TRUE	FALSE	FALSE
FALSE	TRUE	FALSE



# 23 Boolean parameters

$2^{23}$  potential configurations

only 8 tests needed for *pairwise* testing

<http://www.public.asu.edu/~ccolbou/src/tabby/2-2-ca.html>

# CIT Test Generation

CASA tool

based on simulated annealing

uses a SAT solver to resolve constraints

<http://cse.unl.edu/~citportal/>

# CIT Test Generation

Combinatorial Interaction Testing model for CASA:

2

23

2 2

```

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# List of IP addresses, as strings, that:
# * See debug comments, when DEBUG is true
# * Receive x-headers
INTERNAL_IPS = []

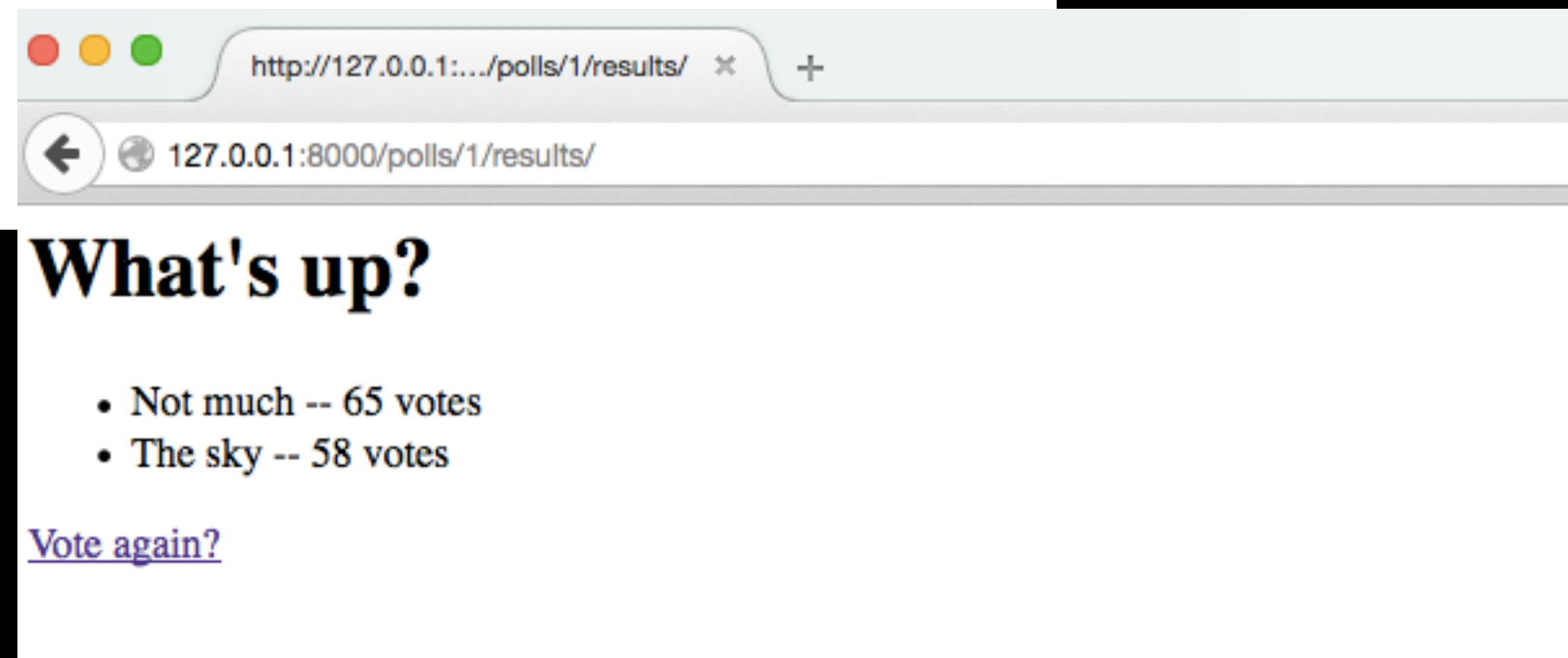
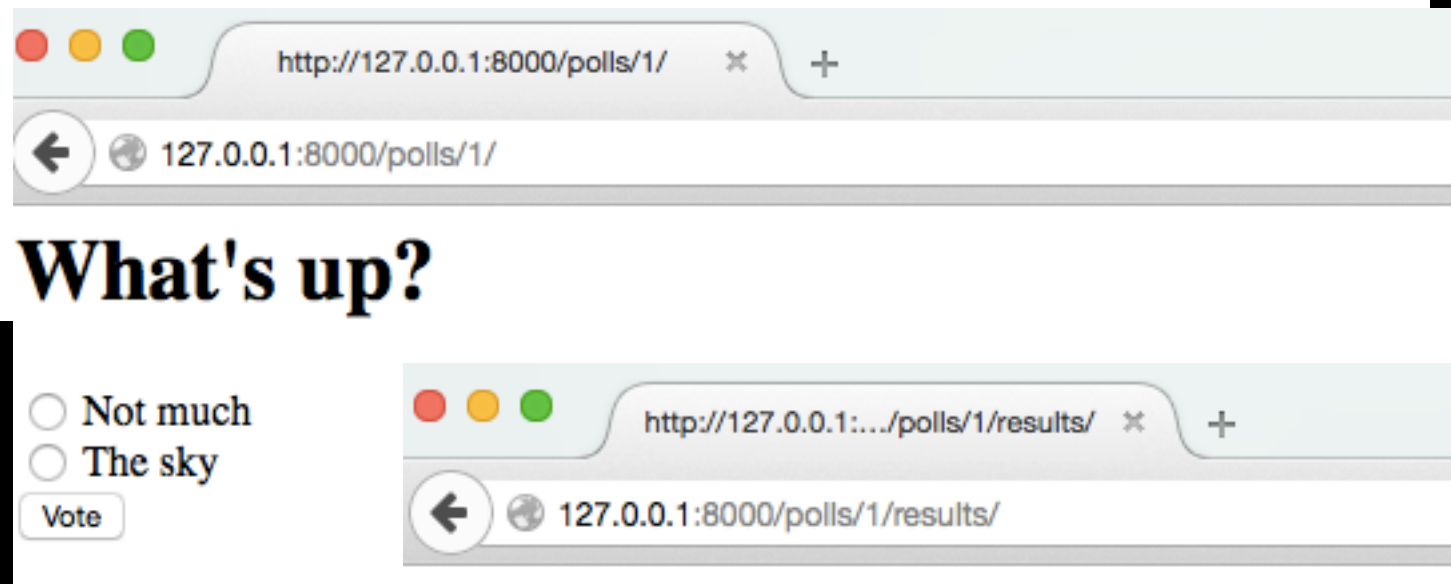
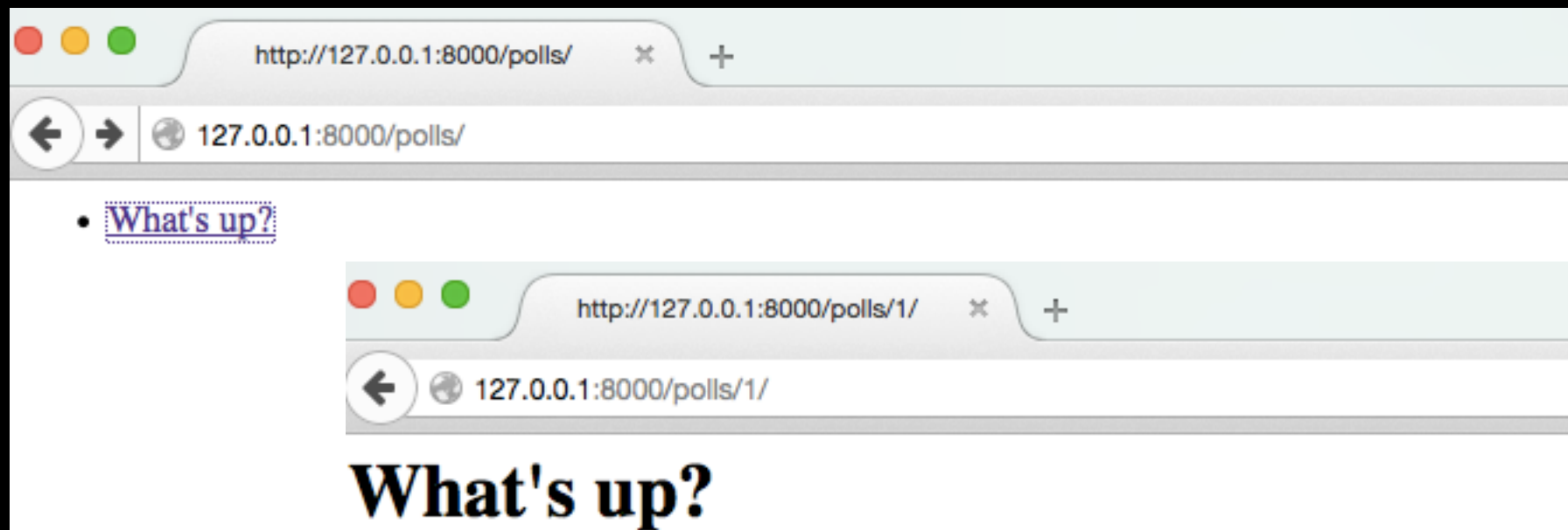
# Hosts/domain names that are valid for this site.
# "*" matches anything, ".example.com" matches example.com and all subdomains
ALLOWED_HOSTS = []

# Local time zone for this installation. All choices can be found here:
# http://en.wikipedia.org/wiki/List_of_tz_zones_by_name (although not all
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# interpreted as the default user time zone.
TIME_ZONE = 'America/Chicago'

# If you set this to True, Django will use timezone-aware datetimes.
USE_TZ = False

```

# Polls Website



# Default Test Suite

9242 tests run on my laptop

all pass regardless of the settings file used

# 4 out of 8 configurations

```
Django version 1.9.dev20150502163522, using settings 'mysite.settings'  
Starting development server at http://127.0.0.1:8000/  
Quit the server with CONTROL-C.  
CommandError: You must set settings.ALLOWED_HOSTS if DEBUG is False.
```

# CIT model

added constraint

```
'DEBUG' = FALSE -> 'ALLOWED_HOSTS' =  
['127.0.0.1', 'localhost']
```



# Pairwise Testing

8 tests (i.e. configurations):

2 passed

2 security errors HTTP 400 thrown

4 HTTP 301 errors

# 2 out of 8 tests



## Secure Connection Failed

An error occurred during a connection to 127.0.0.1:8000. SSL received a record that exceeded the maximum permissible length. (Error code: ssl\_error\_rx\_record\_too\_long)

- The page you are trying to view cannot be shown because the authenticity of the received data could not be verified.
- Please contact the web site owners to inform them of this problem.

[Try Again](#)

[Report this error](#) ▼

```
Django version 1.9.dev20150512110424, using settings 'mysite.settings'
Starting development server at http://127.0.0.1:8000/
Quit the server with CONTROL-C.
[04/Sep/2015 23:35:59]"GET /polls HTTP/1.1" 301 0
[04/Sep/2015 23:35:59]"GET /polls/ HTTP/1.1" 301 0
[04/Sep/2015 23:35:59]code 400, message Bad request syntax ('\x16\x03\x01\x00\xba2\x00\x00\x16\xc0+\xc0/\xc0')
You're accessing the development server over HTTPS, but it only supports HTTP.
```

# 3-way Testing

23 tests covering interactions between any 3 of the 23 Boolean parameters:

4 passed

6 security errors HTTP 400 thrown

11 HTTP 301 errors

2 'Forbidden page' HTTP 403 errors

# 2 'Forbidden page' HTTP 403 errors

## Forbidden (403)

CSRF verification failed. Request aborted.

You are seeing this message because this site requires a CSRF cookie when submitting

If you have configured your browser to disable cookies, please re-enable them, at least

## Help

Reason given for failure:

`CSRF cookie not set.`

In general, this can occur when there is a genuine Cross Site Request Forgery, or when

- Your browser is accepting cookies.
- The view function passes a `request` to the template's [render](#) method.
- In the template, there is a `{% csrf_token %}` template tag inside each POST
- If you are not using `CsrfViewMiddleware`, then you must use `csrf_protect`

You're seeing the help section of this page because you have `DEBUG = True` in your `D`

You can customize this page using the `CSRF_FAILURE_VIEW` setting.

# Analysis

HTTP error 301 caused by:

'PREPEND WWW = True'

it took one user 5 days to find the root cause

Django documentation: 'This is only used if  
CommonMiddleware is installed.'

# Analysis

HTTP error 400 caused by:

'SECURE SSL REDIRECT = True'

HTTP error 403 caused by:

'CSRF COOKIE SECURE = True'

# Conclusions



The screenshot shows a web browser window with the URL `http://127.0.0.1:8000/polls/1/`. The page title is "What's up?" and it contains two radio button options: "Not much" and "The sky", with a "Vote" button below them. Overlaid on the right side of the browser window is a text area containing Django configuration settings:

```
DEBUG = False
TEMPLATE_DEBUG = False
DEBUG_PROPAGATE_EXCEPTIONS = False
USE_ETAGS = False
USE_TZ = False
USE_I18N = False
USE_L10N = False
EMAIL_USE_TLS = False
EMAIL_USE_SSL = False
APPEND_SLASH = True
PREPEND_WWW = False
USE_THOUSAND_SEPARATOR = True
USE_X_FORWARDED_HOST = False
SESSION_COOKIE_NAME = "sessionid"
SESSION_COOKIE_PATH = "/"
SESSION_COOKIE_DOMAIN = None
SESSION_COOKIE_SECURE = False
SESSION_COOKIE_HTTPONLY = True
SESSION_COOKIE_SAMESITE = None
CSRF_COOKIE_NAME = "csrftoken"
CSRF_COOKIE_PATH = "/"
CSRF_COOKIE_DOMAIN = None
CSRF_COOKIE_SECURE = False
CSRF_COOKIE_HTTPONLY = True
CSRF_COOKIE_SAMESITE = None
SECURE_BROWSER_HSTS_SECONDS = 0
SECURE_BROWSER_HSTS_INCLUDE_SUBDOMAINS = False
SECURE_BROWSER_HSTS_PRELOAD = False
SECURE_CONTENT_NEGOTIATION_ENABLED = False
SECURE_CONTENT_NEGOTIATION_PROTOCOL = "text/css"
```



## Secure Connection Failed

An error occurred during a connection to 127.0.0.1:8000. SSL received a record that exceeded the maximum permissible length. (Error code: ...)

CIT can be easily applied to any configurable system



## Paper Submission

Authors are encouraged to submit high-quality, original work that has neither appeared in, nor is under consideration by, other journals.

Springer offers authors, editors and reviewers of *Genetic Programming and Evolvable Machines* a web-enabled online manuscript submission and review system. Our online system offers authors the ability to track the review process of their manuscript with straightforward log-in and submission procedures, and supports a wide range of submission file formats.

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<http://GENP.edmgr.com>.

Choose "Genetic Improvement" as the article type when submitting.

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Deadline: 19 December 2015

or energy use. It is a framework for GI and is able to handle interesting areas of genetic programming, and subsequently

**Scope:** We invite submissions on any aspect of genetic improvement, including, but not limited to, theoretical results and interesting new applications. Suggested topics include automatic:

- bandwidth minimisation
- latency minimisation

ing three "Humies", work that led to the it was able to h resulted in a ACM